

REMARKS

Reconsideration and further examination of this application is hereby requested. Claims 1-18, 20-35, 37-43, 45-55, 57-82, and 84-152 are currently pending in the application. Claims 19, 36, 44, 56, and 83 have been canceled. Claims 121-152 are newly added.

A. The Interview

Applicant appreciates the courtesy extended by Examiner Chawan and SPE Mehta in the personal interview of June 29, 2004. Discussion focused on identifying distinctions between the present invention and the prior art and determining what claim language would be mutually acceptable to define those distinctions clearly.

During the interview an agreement was reached that the claims would define over the prior art if they were limited to i) a fixed optical system, ii) a single sensor, and iii) a ball grid array (BGA), and if the application were terminally disclaimed with respect to two co-pending applications (nos. 09/351,892 and 09/844,626) and three related patents (US 6064756, US 6064757, and US 6072898).

B. The Double Patenting Rejection

Claims 1-86 have been rejected under the judicially-created doctrine of obviousness type double patenting, in view of co-pending application no. 09/844,626. Claims 87-120 have been rejected under the judicially-created doctrine of obviousness type double patenting, in view of co-pending application no. 09/351,892. Additionally, the topic was discussed during the interview.

In order to eliminate any possible question of double patenting issues arising from the family of related applications and issued patents, it was agreed that submission of a terminal disclaimer would be appropriate. Thus, submitted herewith is a terminal disclaimer as agreed in the interview.

C. The Obviousness Rejections

Claims 1-7, 9-29, 34-43, 45-53, 56-60, and 62-86 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. (US 5859924) in view of the Shenghua Ye et al. article entitled "Vision-based system calibration for dimensional inspection." Claims 31, 33, 44, 47, and 55 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. in view of Shenghua Ye et al., and further in view of King et al. (US 6236747). Claims 8, 39, and 61 have been rejected under 35

U.S.C. § 103(a) as being obvious over Liu *et al.* in view of Shenghua Ye *et al.*, and King *et al.*, and further in view of Svetkoff *et al.* (US 5617209). Claims 32 and 54 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu *et al.* in view of Shenghua Ye *et al.*, King *et al.*, and Svetkoff *et al.*, and further in view of Roy *et al.* (US 6118540). Claims 87-91 and 104-108 have been rejected under 35 U.S.C. § 103(a) as being obvious over Toh '040 (US 6141040) in view of Toh '055 (US 6055055). Claims 92-103 and 109-120 have been rejected under 35 U.S.C. § 103(a) as being obvious over Toh '040 in view of Toh '055, and further in view of Kaplan *et al.* (US 6096567). These rejections are respectfully traversed based on the following arguments.

In order for a patent claim to be obvious, the prior art must teach or fairly suggest each and every limitation of that claim. That is because the claim must be considered as a whole.

Independent apparatus claim 72 recites the limitation of a "fixed optical system" at line 4. Independent apparatus claims 87 (refer to line 6) and 104 (refer to line 6) each recite a similar limitation. Independent system claim 1 (as amended) recites the limitation of a "fixed illuminator" at line 5. This distinguishes the claimed invention from references showing

"structured" illumination that must be scanned or moved.

Amended independent apparatus claims 24 (refer to line 4) and 48 (refer to line 4) each recite a similar limitation.

Independent apparatus claim 72 (as amended) recites the limitation of a "single camera" at line 7. Amended independent apparatus claims 87 (refer to line 8) and 104 (refer to line 8) each recite a similar limitation. Independent system claim 1 (as amended) recites the limitation of a "single sensor" at line 7. Amended independent apparatus claims 24 (refer to line 6) and 48 (refer to line 6) each recite a similar limitation.

Independent system claim 1 (as amended) is limited to "inspecting ball grid array devices" at line 2. Amended independent apparatus claims 24 (refer to line 2), 48 (refer to line 2), 72 (refer to line 2), 87 (refer to line 2), and 104 (refer to line 2) each recite a similar limitation.

As agreed during the interview, the prior art of record does not teach or suggest this combination of limitations. Accordingly, it is respectfully submitted that the prior art of record do not support a *prima facie* case of obviousness with respect to claims 1-18, 20-35, 37-55, 57-82, and 84-120.

D. Clarifying Amendments

A number of amendments have been made solely for the purpose of improving the clarity of the claims. Claims 19, 36, 44, 56, and 83 have been canceled so as to eliminate redundant recitation of limitations. Claims 20, 37, 47, 57, 69-71, 77, 84, 103, and 120 have been amended to be consistent with language recited in claims from which they depend.

E. The New Claims

New dependent claims 124, 135, 141, 147, 148, and 152 are directed toward more clearly defining one aspect of the invention in the situation where more than one light source is used to illuminate the ball grid array. As is consistent with the disclosure of the prior art publication US 5245671 to *Kobayashi*, Applicant claims the use of plural light sources that are spectrally diverse from one another.

New dependent claims 121-123, 125-127, 130-132, 136-138, 142-144, and 149-151 are directed toward more clearly defining one aspect of the invention in that the lead of the BGA being inspected is limited variously as being a contact, a pin, bump contact, ball contact, pad, or pedestal. To aid in the understanding of the meanings of these terms in the context of ball grid array lead inspection, Applicant refers to definitions

provided in the glossary section of the textbook *Ball Grid Array Technology*, edited by John H. Lau. Selected pages of this glossary are submitted herewith and are listed on an accompanying form PTO-1449. This publication existed on a date prior to the date of application herein and would have been known to those skilled in the art.

New dependent claims 128, 129, 133, 134, 139, 140, 145, and 146 are directed toward more clearly defining alternate modes of operation of the present invention to provide either combined or discrete images of the multiple views of a ball grid array device.

F. Closing

For the above reasons, Applicant respectfully submits that the application is in condition for allowance with claims 1-18, 20-35, 37-55, 57-82, and 84-152. If there remain any issues that may be disposed of via a telephonic interview, the Examiner is kindly invited to contact the undersigned at the local exchange given below.

AMENDMENT UNDER 37 C.F.R. § 1.111
Appln. No.: 09/844,232

PATENT APPLICATION

The Director of the U.S. Patent & Trademark Office is authorized to charge any necessary fees, and conversely, deposit any credit balance, to Deposit Account No. 18-1579.

Respectfully submitted,

ROBERTS ABOKHAIR & MARDULA, LLC



Jon L. ROBERTS
Reg. No. 31293
(703) 391-2900

ROBERTS ABOKHAIR & MARDULA, LLC
11800 Sunrise Valley Dr.
Suite 1000
Reston, VA 20191
(703) 391-2900